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U.S. Army Force, Pacific*

HAWAII

CIRCULAR NUMBER 101

CHIEF SURGEON'S OFFICE

GHQ AFPAC



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Articles for Publication in Circular

It is desired that the Monthly Circular Letter published by the Chief Surgeon, GHQ, AFPAC, be of maximum value to all of the Medical Department personnel in the field. To that end, articles of professional or administrative nature that might be of general interest are needed. All Medical Department officers as well as the Commanding Officers of Medical Department units and the Surgeons of the major commands are solicited for articles of administrative or technical value. Such articles should be forwarded so as to reach the Chief Surgeon, AFPAC, not later than the 20th of the month preceding the publication of the circular in which it is to appear.

GENERAL HEADQUARTERS
UNITED STATES ARMY FORCES, PACIFIC
Chief Surgeon's Office

CIRCULAR LETTER)
NO. 11)

APC 500
1 October 1946

PART I

ADMINISTRATIVE

SUBJECT

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A. GENERAL

I. Organization of Chief Surgeon's Office

1. The following is a list of commissioned personnel currently assigned to the Chief Surgeon's Office:

Brig. General James A. Bethea	Chief Surgeon
Colonel Albert R. Dreisbach	Deputy Chief Surgeon
Major Frederick H. Gibbs	Executive Officer and Chief, Administrative Division

ADMINISTRATIVE DIVISION

Major Hillas B. Brockett	Chief, Miscellaneous Branch
Lt. T. J. Shelton	Chief, Operations Branch

PLANS AND OPERATIONS DIVISION

Colonel John C. Fitzpatrick	Director
Major John V. Painter	Chief, Supply Branch
Lt. Harold Hendrix	Chief, Medical Records Branch

PERSONNEL DIVISION

Lt. Colonel Lewis C. Shellenberger
Major Sam A. Plemmons
Captain Joseph W. Jacobs

Director
Assistant Director
Chief, Analysis Branch

MEDICAL INSPECTORS DIVISION

Colonel Carl W. Tempel
Lt. Colonel Warner F. Bowers

Director and Medical Consultant
Surgical

MISCELLANEOUS

Colonel Terry P. Bull
Colonel Stanley C. Smock
Lt. Colonel Mary G. Phillips

Dental
Veterinary
Nursing

II. Hospital Fund Property

2. Attention is invited to changes in regulations governing disposition of hospital fund property, published in paragraph 9, War Department Circular No. 215 dated 19 July 1946.

III. Malaria Case Reports

3. Malaria Case Report Cards Form NS-17 are to be submitted by units to the Surgeon of their respective major commands for forwarding to the Office of the Surgeon General, Attention: Historical Division.

IV. Publications Relating to the Medical Department

4. Publications relating to the functions of the Medical Department may be divided into four categories. These are:

- a. War Department publications: These publications are distributed by the Adjutant General Distributing Agencies of all commands. Included among such publications and of particular interest to the Medical Department are: Army regulations and general orders; Technical and Field Manual; Technical Bulletins, Medical (TB MED).
- b. Professional journals and books by private companies or associations.
 - (1) Medical textbooks are issued as set forth in Tables of Organization and Equipment and Medical Department equipment lists and may be obtained by ordering through the usual medical supply channels. For detailed information see SB 8-4 dated 21 March 1944.

- (2) Subscriptions for authorized journals based on authorized allowances are initialled automatically by the Army Medical Purchasing Office. Units not receiving these journals should notify the Army Medical Purchasing Office, 52 Broadway, New York 4, New York. See SB 8-20, May 1944, for additional information.

- c. The Bulletin of the United States Army Medical Department: This publication prepared under the supervision of the Surgeon General is forwarded in bulk shipment from the United States to Surgeons of the major commands for further distribution. Copies are to be distributed to each Medical, Dental, Veterinary, and Sanitary Corps Officer.
- d. Theater of operations regulations and memoranda originating in this theater are distributed as follows:
- (1) Command Directives. AFFAC Regulations, General Orders, Circulars, Information Bulletins, and Training Bulletins are distributed by the Adjutant General's Distributing Agencies as shown in a. above.
- (2) Chief Surgeon's Monthly Circulars are sent in bulk shipments to the Surgeons of the major commands for distribution.

5. Request for additional copies or copies missed should be made as follows:

- a. The publications distributed through the Adjutant General's Office must be procured from the local AGO Distributing Agencies (See AR 310-200). Requisitions for AGO publications should include only such publications as are distributed through that office. Lists of these publications are included in FM 21-6.
- b. Requisitions for publications distributed by the Medical Department should be submitted through regular Medical Department channels.

6. FM 21-6 lists an Index of War Department Publications published quarterly and all offices should be familiar with this manual. Medical officers should know what professional publications (TB, MED, etc.) are available. Some publications will not be found in AG depots in this theater but an effort should be made to get needed publications by placing them on "back-order". An effort should be made to procure all publications necessary for the efficient functioning of medical units.

V. Physical Examinations

7. General. In a group of thirty-three physical examinations on

applicants for admission to the United States Military Academy, West Point, New York, reviewed by the Chief Surgeon's Office, GHQ, AFPAC, on 9 September 1946, only five were properly executed. It is obvious that such physical examinations and reports result in the loss of much time and effort of all concerned. To obviate further difficulty extreme care should be taken by examiners in executing physical examination forms. To this end it is suggested that physical examiners in this theater acquaint themselves with the following:

- a. Proper orders or authorizations indicating the type of examination to be made, the installation at which examination is to be made, and the proper authority to whom this examination is to be forwarded.
- b. The proper physical examination form to be used.
- c. References on physical examinations as listed in paragraph a. below.

8. Discussion.

- a. Proper orders for examination: When an applicant reports to the physical examination board or examiner, it is essential that the applicant bring a copy of official orders or other authorization indicating the nature of the examination and the headquarters to which the report of examination is to be forwarded.
- b. Use of proper forms: The examiner should be familiar with FM 21-6 (War Department Publications) in order that he may select the latest published WD AGO forms available for the execution of physical examinations. In this theater the forms commonly used are:
 - (1) WD AGO Form 38 - Report of Physical Examination of Enlisted Men Prior to Departure, Release from Active Duty or Retirement (1 Dec 44).
 - (2) WD AGO Form 63 - Report of Physical Examination (1 Aug 45).
 - (3) WD AGO Form 64 - Physical Examination for Flying (20 May 41).
 - (4) WD AGO Form 263 - Report of Physical Examination of Candidate for Admission to the United States Military Academy, West Point, New York (16 May 44), see WD Circular 216, 19 July 46.

The requirements for these examinations are varied and much time will be lost if the proper physical examination forms are not used.

- c. Proper execution of the forms: The information required is clearly indicated on the forms, and should not be difficult to complete by careful examiners. The number of Medical Corps Officers signing the record varies according to the type of examination. This must be completed as indicated by current War Department and theater regulations. In this connection, paragraph 3c, change 2, AR 40-105 dated 9 August 1946 is quoted:

"c. In the case of officers, warrant officers, and candidates for the United States Military Academy, and as otherwise specified in current directives, the examinations will be accomplished by not less than three and signed by three Medical Corps officers. In all other cases, the examination will be accomplished by not less than two Medical Corps officers and signed by the number of such officers indicated on the appropriate form."

9. References: It is essential that the physical examiners have available AR 40-100, 40-105, 40-110, MR 1-9, and War Department Circular 216 1946 with all current changes. The recognition of defects and conditions which are cause for rejection can not be determined without these references, nor can it be determined when waivers are required and under what conditions they may be recommended.

VI. Sobriety of Patients

10. Numerous line of duty board proceedings and reports of investigations in injury cases forwarded to the Commander-in-Chief have been incomplete insofar as to statement as to whether individual involved was under the influence of intoxicants or drugs. Due to the rapid transfer and return to the United States of Medical Corps officers, it is often impracticable to obtain this information if it is not entered on the individual's record by the first Medical Corps officer who examines patient. It is suggested, therefore, that in the future when any military patient reports for treatment following an injury, a statement as to whether or not the patient was under the influence of intoxicants or drugs, together with degree of influence, be made. This statement should be made a matter of record by the first Medical Corps officer examining each case of injury.

VII. Subsistence Accounts for ECOF Personnel

11. Due to an error in printing the exhibit referred to in Section VI, paragraph 14, page 5, Circular No. 10, Chief Surgeon's Office, GHQ, AFPAC, dated 1 September 1946, was omitted. The entire paragraph with exhibits are reprinted in this issue.

12. Subsistence bills for ECOF personnel in Japan should be

submitted on forms provided by them to the Sub Depot Cash Office, British Commonwealth Sub Area, Empire House, Tokyo. If the special forms are obtained prior to billing, it will eliminate a possible cause of delay in collection of accounts. The numbers of these forms are BCOF Form T. S. 4 and Treasury Form No. 16. Copies of these forms are reproduced herein as Exhibit "A". Local reproduction is authorized.

VIII. Conversion of Old Type Japanese Currency.

13. The following case of payment to military personnel for a blood transfusion in old type Japanese Yen is cited for the information of all concerned.

- a. The following is an extract of a letter from Headquarters, 13th General Hospital, APO 660, dated 13 September 1946, to the Fiscal Director, General Headquarters, United States Army Forces, Pacific, APO 500.

"1. Request instructions as to the procedure in converting ¥ 375 old type Japanese Bank of Japan notes to new Type A currency.

"2. The above amount represents payment to the Hospital Fund, 13th General Hospital, APO 660, for a blood transfusion given to the son of a British subject by one of the soldiers in the Medical Detachment at this hospital.

"3. The admission of patient to this hospital was under the provision of paragraph 6 ad (emergency) AR 40-590, and authorized by current AFPAC and Eighth Army directives.

"4. Success in maintaining adequate list of blood donors depends a great deal upon promptness in payments. No provision, to my knowledge, has been made for conversion in accounts of this nature."

- b. Reply to the above cited letter by the Office of the Fiscal Director, General Headquarters, United States Army Forces, Pacific, APO 500, dated 17 September 1946, is quoted.

"1. The governing directive on indigenous currency control, AFPAC Circular Number 52, current series, provides that exchanges for Type A Military Currency will only be effected where the source of the currency presented is from net Army cash pay and allowances or from prior encashments of dollar instruments through Army disbursing officers and Army Post-offices. In view of the foregoing, the conversion of the currency in question cannot be made through Army channels.

Form T.S.4.
(Treasury Form No. 12.)
(Reprinted July, 1942.)

THE COMMONWEALTH OF AUSTRALIA

Dr. to

(Name)

(Address)

Departmental Registration No.

Consecutive No.

Creditor's Reference No.

To be filled in by Creditor and
quoted by Dept. on Advice Note
accompanying cheque.

[illegible]

I certify that this account is correct,
covered by proper authority, and the amount
thereof noted on such authority.

Date / /

Date / /

Date / /

Examining Officer.

REGISTERS.	INITIALS.
Claims Recd.	
Departmental or Personal	
AUTHORITIES.	NO.
Form T.S. 1 or T.S. 2	
Contract	
Gazette	
Order in Council Schedule	

I certify that this account is correct as regards computations, castings, rates of charge, the faithful performance of the services charged, and is covered by proper authority.

I certify that this account is correct within the meaning of Section 34 of the Audit Act 1901-34.

Date / / Person incurring expense.

Date / / *Certifying Officer.*

RECEIPT.

RECEIPT.
(For use only when claim is paid in cash.)

Received on the _____ 19____ from Department of Defence
the sum of _____ pounds _____ shillings
and _____ pence in full payment of the above account.

Witness to Payment and Signature.

Signature _____

Cheque Number

"2. It is suggested that representation be made to the local British Commonwealth Occupational Forces' authorities with a view to authorization of payment from the dollar deposit to their credit with the Finance Officer, 240th Finance Disbursing Section, APO 500."

IX. Medical Department Enlisted Replacements

14. For the first time in several months fairly large increments of Medical Department enlisted replacements are being received from the United States. The majority of these replacements are not trained in any specialty. It is desired to call to the attention of all medical unit commanders the necessity for prompt and thorough training of these men. Some specialists are included in most shipments, but there is no reason to believe that such personnel will be received in sufficient numbers to meet present or future requirements.

15. Some technical and most administrative specialists can be adequately trained by understudy or "on-the-job" training provided they are being supervised by individuals who are themselves thoroughly qualified in the specialty concerned. However, specialist schools are ideally equipped and staffed to provide the necessary training and should be fully utilized in commands where they are available.

X. Regular Army Appointments

16. Information received in a recent War Department radio indicates that approximately 25,000 additional wartime officers are to be integrated into the Regular Army. This means that the total authorized strength for the peacetime officer corps will be 50,000 the largest in the nation's history. It is quite obvious that there will be an urgent need for additional Regular Army Medical Department officers. Officers of the various corps of the Medical Department who meet the prescribed qualifications and who submit their application prior to 31 December 46 will be considered for appointment in the Regular Army.

17. Although the exact timing schedule is not yet established, the following advance information is presented to indicate planned phasing:

- a. The War Department circular governing the next integration program will probably be published and distributed in the field prior to 15 October 46.
- b. The application phase of the program will cover the period from 15 October 46 through 31 December 46.
- c. Officer screening centers will operate during the period from 1 December 46 through 31 March 47.
- d. During the period from 15 October 46 to 31 December 47 appointments will be made in four increments as follows:

- (1) 1 January 1947--small increment composed mostly of persons on consideration list.
- (2) 1 May 1947--a considerably larger list to be appointed from new and old applicants.
- (3) 1 September 1947--a considerably larger list to be appointed from new and old applicants.
- (4) 1 December 1947--a list to be appointed from new and old applicants.

18. All Medical Department Officers in the theater are urged to give this matter their serious consideration.

PART II

TECHNICAL

XI. Healing of Wounds (Part II)

Relationship of State of Hydration to Wound Healing: Water is necessary to carry nutritive elements in and waste products out of the area of the wound. These solutions must be isotonic with blood so that large amounts of fluid are necessary. In the presence of tissue breakdown much more than normal amounts of fluid are needed to carry off the degradation products of tissue. Either too much or too little fluid retards wound healing. This point seems sufficiently obvious so that no further discussion is necessary. The state of hydration of a surgical patient may be gauged by one of several methods:

1. Level of Urinary Output: It is generally assumed by surgeons that if a patient excretes at least 600 cc of urine daily a minimal intake is present. A more satisfactory level, however, is around 1000 cc per day.
2. Blood Specific Gravity: This is an extremely sensitive test for hydration, variations in the third and fourth decimal place being clinically significant. The falling-drop method, or the method using copper sulphate solutions of various specific gravities have been widely publicized and are entirely satisfactory, even for field use.
3. The McClure-Aldrich Salt Edema Test: This simple test depends on the rapidity with which intradermal wheals of normal salt solution are absorbed. Normal tissues absorb this isotonic wheal slowly (in about 60 minutes), dehydrated tissues craving fluid absorb the wheal rapidly and edematous tissues absorb the wheal more slowly than normal.

Relationship of Electrolyte Balance to Wound Healing: Sodium chloride is the most important electrolyte from the standpoint of cellular physiology and is almost entirely responsible for the osmotic pressure of intercellular fluid. Too much salt in the tissues attracts fluid from the vascular tree, edema develops and edematous tissues do not heal properly because of inefficient ingress and egress of materials. It is important to remember that normal individuals can excrete about 25 grams of sodium chloride daily but a bed patient may excrete only about 15 grams. Three liters of saline solution contain roughly 30 grams of salt so that a patient receiving this amount of saline solution in twenty-four hours will retain about 15 grams of salt which would attract 1500 cc of water to hold the salt at isonicity.

Such patient then rapidly develops clinical edema. Consequently, it is wise never to give more than 1500 cc of saline daily and the remainder of the necessary fluid intake should be of glucose in distilled water. Too little salt in the tissues causes a loss of fluid into the vessels with a consequent dehydration of tissues. Adequate fluid balance, therefore, depends on salt balance and both are of great importance basically in wound healing.

Relationship of Level of Protienemia to Wound Healing: If the quantitative level of blood protein is decreased the osmotic pressure and the diffusion gradient are altered so that fluid tends to leave the vessels and accumulate in the tissues. A blood protein level lower than 5 mg. percent results in this type of edema. Low protein level and edema both retard wound healing. Ravdin has shown that abdominal wound disruption eventuated in over 70% of animals operated upon while in a hypo-protienemic state. There was little evidence of fibroplasia in these wounds up to two weeks post-operatively. On the other hand a high protein diet speeds up wound healing and almost completely eliminates the lag phase. The intravenous use of amino acids in post-operative patients has been shown to improve the general feeling of strength of patients as well as to improve wound healing. Experimentally it has been shown that corneal injuries treated locally by the application of amino acid solutions containing cystine, proline, asparagine and glutamine heal in one-third the time required for control injuries treated by saline solutions and boric acid ointment.

Effect of Increasing Metabolic Rate to Speed Wound Healing: The routine administration of thyroid extract has been advocated in order to speed metabolism, increase circulatory rate and promote healing. This also has been advocated as a prophylaxis against the dreaded post-operative complications of thrombophlebitis and pulmonary embolism. It is not felt that this procedure, however, is worth employing because of the undesirable side effects which are disturbing and because of the fact that goiter incisions in toxic patients do not heal more readily than other neck incisions and finally because of the continued incidence of thrombophlebitis, even in post-operative toxic goiter cases.

Relationship of Local Blood Flow to Wound Healing: Local blood flow brings in most of the cellular elements important in healing, brings in most of the nutritional elements, and carries off metabolites. If a large vein is damaged it should be ligated because the thin wall precludes suture, veins usually are multiple and plenty of venous channels will remain. If a large artery is damaged, a different physiological problem arises. The artery should be preserved if feasible by methods which are not germane to this discussion; but if ligated, Blalock has shown that the accompanying large vein also should be ligated. This has the effect of causing blood which manages to reach the area to remain there longer and thus injured tissues have more time to make use of it. If the artery alone is tied, venous channels overbalance the arterial supply and the area will be drained of blood. This is the mechanism by which

ischemic gangrene develops if the artery alone is ligated. This is a difficult point to get across to surgeons and many teach it but lack the courage of their convictions. The rationale is clear and it works in practice. It should be borne in mind that a sympathetic block may be of value to increase local blood flow in some cases to accelerate wound healing.

Effect of Temperature on Wound Healing. Exogenous: It is a common practice to apply external heat to most wounds by means of hot packs, hot water bottles or light cradles. However, heat should be used very cautiously if there is any vascular impairment because:

1. Heat may speed up local metabolism to the point where damaged vessels cannot adequately supply the need for fuel and gangrene results.
2. Heat cannot be carried away because of damaged vessels so that a cumulative effect results and causes increased tissue damage.

In the presence of vascular damage it is unwise ever to use more than 100 degrees and a thermometer always should be placed inside a light cradle. Refrigeration in the presence of vascular damage probably is more rational than the use of heat. Refrigeration decreases the metabolic needs so that poor circulation may be adequate. Fay attempted to apply this principle to the treatment of tumors because malignant tissue has a higher metabolic rate than normal tissue but the degree of difference is not sufficient to make the method clinically effective. The work of Bisgard with respect to the action of heat and cold is worthy of mention at this point. He showed clinically that external application of heat decreases gastro-intestinal peristalsis, whereas heat internally applied increases peristalsis and secretion. Cold had an opposite effect, namely, cold externally applied increases peristalsis whereas internally administered it decreases peristalsis and secretion.

Endogenous: Menkin has shown that inflammatory exudate in the acid stage contains a substance called pyrexin, capable of causing fever by action on the heat regulating center in the hypothalamus. This is not a bacterial product but a tissue product in response to inflammatory changes. Pyrexin is a glucopeptide usually associated with the euglobulin fraction of inflammatory exudates. Fever has been thought of as a defense mechanism and does have some beneficial results but mostly its effects are harmful and it is a toxic phenomenon. Aron recently has shown that fever decreases the circulating plasma level of Vitamin A and carotene. This level slowly approaches normal four or five days after cessation of fever. This definitely hinders wound healing. The alleged non-specific stimulation of wound healing by subcutaneous injection of typhoid vaccine, milk and other proteins consequently is probably not entirely beneficial.

Role of Tissue Pressure and Tension in Wound Healing: In any hollow viscus distension of the lumen or increase in tissue tension will decrease blood flow by vascular compression and slowing of the blood stream initiates inflammatory changes on a mechanical basis. If pressure and tension are sufficient this will lead to gangrene and perforation. Wound healing in other tissues is slowed by increased pressure of tissue because of interferences of blood flow and consequent hinderance of all physicochemical processes. Brooks has shown that the period of viability of tissue rendered completely anemic by pressure is remarkably constant at eighteen hours. The time element is of greater importance than the degree of pressure as very low pressures may cause gangrene if applied over a long period of time. A practicable application of this point includes the fact that edema or tight applications such as casts, bandages or tourniquets may exert sufficient pressure to cause an inflammatory reaction. This always is followed by laying down of connective tissue and mild degrees of damage, which heal by fibrosis, especially if located in muscular tissue, may cause subsequent painful dysfunction.

Role of Immobilization in Wound Healing: The use of immobilization is a well established principle in the treatment of fractures but its benefits are not so well known in soft tissue wounds and infections. Wangenstein has shown that complete immobilization of soft tissue wounds and injuries relieves pain, prevents deforming contractures, speeds resolution of the inflammatory reaction and greatly facilitates nursing care. This principle was effectively used in the Spanish war by Trueta. Immobilization may be achieved by the use of plaster casts, orthopedic splints or immobilizing dressings.

Role of Force of Gravity in Wound Healing: There has been considerable debate as to whether inflammatory reaction is the result of bacterial action or whether it is a defense mechanism of the host. If the former, our aim should be to combat it and if the latter obviously we should preserve or augment it. Increased local heat and blood supply probably are beneficial. Edema fluid is said to contain antibodies and swelling is said to inhibit the speed of invading organisms. On the other hand fever decreases the vitamin level while swelling increases pain, decreases circulation and slows the healing process. Also the bacterial spreading factors may function better in the dilute medium of edematous tissue. All in all it seems that the inflammatory process is more harmful than beneficial. Elevation definitely reduces inflammatory edema and makes the patient more comfortable. It also speeds healing and may actually be life saving in some cases of laryngeal edema where placing the patient in an upright position has obviated the necessity for tracheotomy. However, there are two dangers connected with the use of elevation which should be borne in mind:

1. Elevation of the lower extremities places an extra load on the vascular system because blood does not flow uphill without the expenditure of work. Particularly in older people

the angle of circulatory efficiency should be closely watched. The toes should be checked for temperature and the vessels for pulsation. Several cases have been seen where gangrene developed even in young people from excessive and prolonged elevation of the leg. Pain on elevation means ischemia and is a danger sign.

2. Elevation may cause pus to settle by gravity and travel along tissue planes towards the trunk. A number of gravitational abscesses have been seen to develop under casts applied with the leg in elevation where the abscess was some distance proximal to the site of infection.

Relationship of Primary Adhesion and Suture Material to Wound

Healing: All sutures are foreign bodies and set up more or less reaction in tissues. Part of the effect in healing is expended by tissues in coping with suture material introduced by the surgeon. The ideal state would be the elimination of suture material and the nearest present approach lies in the use of the fewest sutures possible, the use of type of suture material which is least irritating and the use of sutures of the smallest size. The primary adhesion method of Sano approaches the ideal desideratum but has limited application. This primary adhesion method consists of fibrin agglutination and the exact method need not be discussed here. It seems to be applicable, however, in skin grafting, in wounds which can be closed without tension, and experimentally has been successful in lacerations of the liver and spleen. Also experimentally, primary adhesion of grafts over gastro-intestinal suture lines has been very successfully used. The different suture materials vary in their degree of propensity to evoke tissue reaction. Catgut is the greatest offender because it is a foreign protein which causes a sterile inflammatory response accompanied by fluid accumulation and marked cellular response. The question of allergy to catgut in wound dehiscence has been raised but probably is not warranted although some individuals respond more vigorously to the introduction of catgut and absorb it very rapidly. Silk causes little reaction unless infection supervenes in which case bacteria grow in the interstices and healing is not complete then until all silk is extruded. Cotton produces very little reaction and is said to differ from silk in that it allegedly can be used in an infected field. Wire causes almost no reaction but eventually is fragmented and removed by oxidation. However, it has the disadvantage of being unyielding and readily cuts through tissue. Also, if used too near the surface painful scars are prone to develop. Plastic sutures such as nylon have the advantage of non-absorbability, slight elasticity and lack of inflammatory stimulation. Choice of suture material should be made bearing these factors in mind.

Wound Pain and Its Interpretation: Immediately after injury the anesthesia of trauma is present and this is followed subsequently by the pain of exposed or damaged nerve ends. After this period is past the pain of edema with pressure on nerve ends may develop. Post-operatively the early wound pain is apt to be the result of trauma and this pain and reaction are in direct

proportion to the roughness with which tissues are handled. Subsequent post-operative pain may be due to hematoma or edema in the wound and later wound pain is most apt to indicate developing infection. After the cause of wound pain has been determined the method of management then may be considered. Simple immobilization may be adequate and sufficient. Morphine is the customary drug of choice but patients in shock should be carefully observed for delayed action when the drug is subsequently absorbed. Barbiturates have some use in the control of pain and also have the beneficial effect of delaying onset of shock for at least eight hours in experimental series. Application of heat has a soothing effect but it must be remembered that heat increases edema by increasing capillary permeability and arteriolar pressure so is not entirely beneficial. The use of cold, which is a protoplasmic anesthetic, is suitable in selected instances. In summary bio-physical, mechanical, chemical and bacterial factors briefly have been considered as they relate to wound healing. In a subsequent section, management of infected wounds will be considered.

XII. True Rupture of the Liver - Report of a Case (Submitted by Capt. J. L. Ivins, MC, Chief of Surgical Service, 5th Station Hospital):

Subcutaneous ruptures of the liver carry a remarkably high mortality, reported by workers from 50% to 85%. True ruptures (as distinguished from subcapsular ruptures) involve the right lobe of the liver most frequently and usually the upper convex surface. The symptoms generally are dependent on hemorrhage from the liver. Tenderness and muscular rigidity especially marked along the right costal margin are prominent signs. Since the end of combat the subcutaneous type rupture of the liver is more frequent than the penetrating type of rupture, and at present, probably the most dangerous foe of the occupation forces is the "jeep" in producing injuries. We wish to report a case of true rupture of the liver complicated by a fractured rib and a hemopneumothorax on the right. The entire picture was obscured and the diagnosis of liver rupture was made at the time of operation.

Case Report: At about 1045 on 18 July 1946 Pfc T.M. was riding in a jeep on one of the back roads near Irumagawa, Honshu, Japan. The driver swerved off the road to avoid striking a Jap and ran into a Japanese home. The patient was riding next to the driver and was thrown forward, striking the right side of his chest against the rifle mount in the jeep. He was not knocked unconscious but experienced severe pain in his right chest on breathing. He was given several glasses of water at the scene of the accident and these he vomited immediately.

Pfc T.M. was admitted to the 5th Station Hospital at about 1400 hours 18 July 1946. On admission the patient was restless, apprehensive and respirations were shallow and rapid. His skin was pale and he was in a cold sweat. There was an abrasion, 2" x 2", on the right in the nipple line over the 8th rib which was surrounded by an area of subcutaneous emphysema. Respirations were shallow, forced and 40 per minute. There was tenderness over the

8th rib anteriorly. Percussion note in the axillary line was dull, breath sounds were diminished over the lower one third of the right lung. There were scattered bubbling rales over the right lower lung field. B.P. was 100/0, pulse 140 per minute and regular. The heart did not appear to be shifted. The abdomen was rigid and tender in the right upper quadrant with no rebound tenderness. Bowel sounds were audible in the left lower quadrant. There was moderate suprapubic tenderness. The percussion note over the abdomen revealed normal tympany. The rectal examination was negative. An upright x-ray of the abdomen revealed no gas under the diaphragm. Chest x-ray revealed a fracture of the right 8th rib at the lateral border. There was a fluid level at the 9th rib posteriorly. Urinalysis showed a 1+ albumin, casts, red blood cells and white blood cells. Blood count 5,230,000, 90% hemoglobin, white blood count 29,150 (85% neutrophils and 15% lymphocytes). The patient was given 2 units of plasma intravenously and oxygen by mask immediately and was started on Penicillin (30,000 units every 3 hours). By 1800 hours the patient appeared better; his color had improved; blood pressure was 118/70 and pulse was 112 per minute; the abdomen was still unchanged and respirations were less labored. The patient spent a fairly comfortable night.

The following morning, 19 July 1946, the patient complained of cramps in the abdomen and had moderate gaseous distention. The abdomen in the right upper quadrant was still rigid with moderate rebound tenderness. Temperature was 99.8°, pulse 96 per minute. A repeat flat plate of the abdomen was taken which revealed a definite "step-ladder" pattern in the small intestines. It was decided that an exploration of the abdomen was indicated and at 1500 hours on 19 July 1946 a laparotomy was done. Pre-operative diagnosis: Fracture, right 8th rib; hemopneumothorax; generalized peritonitis secondary to rupture of the small intestine.

Operation: Under spinal anesthesia (75 milligrams procaine and 10 milligrams pontocaine) the abdomen was prepared and a right upper rectus muscle splitting incision was made. About 350 cc dark blood and numerous large blood clots were evacuated. There was a transverse tear in the superior surface of the right lobe of the liver about 7 centimeters long and about 1 centimeter deep. The intestines and mesentery were intact. The rent in the liver was packed with iodoform gauze, one pack being brought out through a lateral stab wound and the other pack being brought out from the upper angle of the abdominal incision. The patient received 500 cc citrated whole blood while on the table. Blood pressure was 160/90 and pulse was 120 per minute.

Postoperative Course: The patient received 500 cc citrated whole blood upon returning to the ward and his condition was considered good. The patient spent a restless night; his temperature did not rise above 100.2°. The following day the patient received intravenous fluids to 3000 cc. Blood pressure was 156/90, pulse 100 per minute. Repeat blood count still showed a leukocytosis with a left shift differential. On the third postoperative day the packs were removed, his blood pressure and pulse remained unchanged.

Bowel sounds were audible and an examination of the chest revealed the fluid level had reached the 5th intercostal space posteriorly. An x-ray confirmed this; the heart was pushed far to the left on the x-ray. The patient was moderately dyspneic, so a thoracentesis was done under local anesthesia in the 8th intercostal space in the posterior axillary line, removing 900 cc of dark bloody fluid. The blood count was repeated and showed red blood cells 4,350,000, while blood cells 23,850 (91% neutrophils). The fluid balance was maintained with intravenous fluids (5% glucose in normal saline solution). The patient was started on a liquid diet and parenteral Vitamin B₁ on the fourth postoperative day. The following day the red blood count was 3,700,000, 500 cc of citrated whole blood transfusion was given. Thoracenteses were done on the 24th of July and on the 25th of July with the removal of 375 cc and 60 cc respectively of dark sanguinous fluid. Following the second chest tap the temperature came down to normal and the patient was remarkably improved. The abdominal wound had drained moderate amounts of dark serosanguinous fluid, but this drainage had stopped on the twelfth postoperative day. On the tenth postoperative day the patient was allowed out of bed and suffered no untoward effects. A high carbohydrate, low fat diet was enforced and the patient ate with good appetite. All laboratory studies, including plasma proteins and icterus index, were normal. A chest x-ray on the 13th of August 1946 revealed clear lung fields. The patient received a total of 2,400,000 units of penicillin.

Summary: We are reporting this as an interesting case of true rupture of the liver complicated by a hemopneumothorax. The patient was brought into our station hospital in shock and markedly dyspneic which we attributed to his fractured rib and hemopneumothorax. The localizing signs in the right upper abdominal quadrant were considered as probably being secondary to the chest condition, and when an x-ray of the abdomen revealed the picture of a peritonitis, we thought first of the insidious picture of hemorrhage. The liver rupture was packed since the rupture was inaccessible through an abdominal incision. The patient was returned to full military duty six weeks after admission to the hospital. We intend to follow the patient for the next six months with check-up x-rays and liver function studies.

PART III
STATISTICAL

XIII. Evacuation

1. During the month of August the following patients were evacuated from the several major commands:

	<u>AIR</u>	<u>WATER</u>	<u>TOTAL</u>
EIGHTH ARMY	147	263	410
AFMIDPAC	55	10	65
AFWESPAC	81	22	103
XXIV CORPS (Unclassified)			98

2. The following are the evacuations per 1000 strength for the month of August:

JAPAN	2.80
KOREA	2.21
AFMIDPAC	1.51
AFWESPAC	0.89
AFPAC	1.93

3. As of 31 August 1946 the following number of patients were awaiting evacuation:

EIGHTH ARMY	272
AFMIDPAC	22
AFWESPAC	366
XXIV CORPS	25

XIV. Hospitalization

1. The Bed Status Report of 31 August is as follows:

	<u>TOTAL T/O BEDS PRESENT</u>	<u>TOTAL T/O BEDS ESTABLISHED</u>	<u>TOTAL T/O BEDS OCCUPIED</u>
EIGHTH ARMY	6,250	5,586	2,551
AFMIDPAC	2,300	2,300	952
AFWESPAC	5,500	4,697	3,167
XXIV CORPS	2,350	2,250	798
TOTAL	16,375	14,808	7,463

2. Number of authorized beds, percent of authorized beds occupied, percent of operating beds occupied and percent of actual military strength in hospitals as patients are listed below:

	<u>BEDS AUTHORIZED</u>	<u>% AUTHORIZED BEDS OCCUPIED</u>	<u>% OPERATING BEDS OCCUPIED</u>	<u>TOTAL PATIENTS IN HOSPITAL, % OF ACTUAL MILITARY STRENGTH</u>
JAPAN	5623	45	45	1.74
KOREA	2302	34	35	1.80
AFMIDPAC	1515	62	41	2.22
AFWESPAC	4882	64	67	2.74
AFPAC	14182	52	50	2.14

Actual strength equals 98%
of authorized strength.

3. Tables showing various admission rates are listed below:

ADMISSION RATES PER 1000 per ANNUM

All Causes

<u>Week Ending</u>	<u>AFPAC</u>	<u>AFMIDPAC</u>	<u>AFWESPAC</u>	<u>JAPAN</u>	<u>KOREA</u>
5 July 46	611	206	650	707	635
12 July 46	647	190	649	761	626
19 July 46	654	200	578	822	640
26 July 46	664	206	656	785	675
2 August 46	630	191	613	727	757
9 August 46	635	216	648	708	734
16 August 46	595	191	618	667	678
23 August 46	638	219	568	762	730
30 August 46	607	210	553	731	659

Disease

5 July 46	544	154	596	629	459
12 July 46	588	153	597	696	556
19 July 46	592	162	532	743	571
26 July 46	613	167	611	712	601
2 August 46	562	165	555	648	670
9 August 46	576	168	592	646	669
16 August 46	538	169	563	599	634
23 August 46	580	180	525	693	655
30 August 46	552	184	495	670	609

Injury

5 July 46	67	52	54	77	76
12 July 46	58	36	51	65	69
19 July 46	62	37	45	79	69
26 July 46	61	38	45	73	74

ADMISSION RATES PER 1000 PER ANNUM

Injury (Con't.)

<u>Week Ending</u>	<u>AFPAC</u>	<u>AFMIDPAC</u>	<u>AFWESPAC</u>	<u>JAPAN</u>	<u>KOREA</u>
2 August 46	68	35	58	79	86
9 August 46	58	48	55	61	63
16 August 46	56	23	54	67	55
23 August 46	58	40	43	68	76
30 August 46	55	26	58	61	50

Psychiatric

5 July 46	8.8	14	13	7	2.8
12 July 46	11.2	13	15	9	10.5
19 July 46	8.2	9	10	8	2.0
26 July 46	6.8	10	10	4	3.0
2 August 46	6.9	10	8	5	4.1
9 August 46	8.5	9	8	9	6.3
16 August 46	7.2	13	9.7	4	4.6
23 August 46	8.0	6	11	6	4.9
30 August 46	8.9	23	8.2	6	8.2

Organic Neurological Disease

5 July 46	.7	0	1.1	.3	0
12 July 46	.7	0	2.1	0	0
19 July 46	1.4	0	3.4	.6	0
26 July 46	.5	0	.8	.6	0
2 August 46	.8	0	2.1	.3	0
9 August 46	.6	0	1.3	.3	0
16 August 46	.6	0	.8	.3	1.1
23 August 46	.7	0	1.8	.3	0
30 August 46	.6	0	1.8	0	0

Common Respiratory Disease

5 July 46	57	13	54	84	23
12 July 46	62	17	81	64	35
19 July 46	61	30	68	67	49
26 July 46	67	37	87	63	54
2 August 46	67	34	90	67	37
9 August 46	59	19	84	56	39
16 August 46	61	41	71	65	43
23 August 46	60	30	70	61	50
30 August 46	66	21	88	66	40

ADMISSION RATES PER 1000 PER ANNUM

Influenza

<u>Week Ending</u>	<u>AFPAC</u>	<u>AFMIDPAC</u>	<u>AFWESPAC</u>	<u>JAPAN</u>	<u>KOREA</u>
5 July 46	2.9	0	8.7	.3	0
12 July 46	1.9	0	3.4	2.0	0
19 July 46	2.9	0	6.0	2.0	0
26 July 46	3.9	0	10.2	1.2	0
2 August 46	5.9	0	15.4	2.0	0
9 August 46	4.4	0	8.3	4.1	0
16 August 46	2.5	0	6.1	1	0
23 August 46	2.5	0	3.6	2.8	0
30 August 46	2.6	0	.6	.8	0

Primary Atypical Pneumonia

5 July 46	3.5	0	7	1.6	4.7
12 July 46	6.9	0	13	4.0	3.8
19 July 46	5.3	1.4	13	1.3	1.0
26 July 46	7.6	2.8	19	1.2	3
2 August 46	8.3	4.7	18	1.0	9.2
9 August 46	9.5	3.7	17	5.1	8.5
16 August 46	9.5	2.4	20	3.4	8.1
23 August 46	11	1.5	21	3.2	18
30 August 46	9	3.2	18	3.9	5.7

Common Diarrhea

5 July 46	6.8	0	17	3.0	0
12 July 46	8.4	1.4	17	4.7	4.8
19 July 46	10.2	1.4	15	11.0	1.0
26 July 46	9.1	1.4	14	7.2	5
2 August 46	8.9	0	15	8.5	4.1
9 August 46	7.3	0	15	5.1	1.0
16 August 46	7.7	0	17	3.8	2.3
23 August 46	5.9	0	15	1.4	2.4
30 August 46	16	3.2	38	7.0	2.3

Bacillary Dysentery

5 July 46	1.1	0	3	.3	0
12 July 46	1.4	0	4	0	0
19 July 46	1.1	0	.4	2.3	0
26 July 46	.5	0	1.2	.9	0
2 August 46	.4	0	1.2	.3	0
9 August 46	1.0	0	2.2	.6	0
16 August 46	1.6	0	3.9	.7	0
23 August 46	1.0	0	1.8	1.0	0
30 August 46	1.1	0	1.8	1.1	0

ADMISSION RATES PER 1000 PER ANNUM

Amebic Dysentery

<u>Week Ending</u>	<u>AFAPAC</u>	<u>AFMIDPAC</u>	<u>AFWESPAC</u>	<u>JAPAN</u>	<u>KOREA</u>
5 July 46	2.9	0	8.3	.6	0
12 July 46	2.8	0	11.7	.6	.9
19 July 46	3.6	0	9.5	.6	1.0
26 July 46	4.1	0	10.6	.9	0
2 August 46	4.9	0	13.2	1.3	0
9 August 46	2.7	0	6	.3	4.2
16 August 46	3.0	0	7.5	1.7	3.5
23 August 46	4.0	0	10.5	.3	2.4
30 August 46	5.3	0	14.2	.8	0

Malaria

5 July 46	35	1.4	51	30	35
12 July 46	36	2.8	54	30	33
19 July 46	52	4.3	85	37	53
26 July 46	39	8.6	67	35	46
2 August 46	41	7.1	51	22	100
9 August 46	42	6.1	60	25	86
16 August 46	45	7.2	58	23	125
23 August 46	40	9.2	45	25	104
30 August 46	40	4.9	36	18	144

Infectious Hepatitis

5 July 46	5.7	1.4	7.4	5.4	6.5
12 July 46	5.2	0	9.1	2.0	9.6
19 July 46	3.3	0	3.8	4.0	2.0
26 July 46	5.2	1.4	8.9	5.2	5
2 August 46	4.8	0	5.1	3.4	12.3
9 August 46	4.0	2.4	5.2	3.8	3.1
16 August 46	4.8	0	4.7	4.5	10.4
23 August 46	4.0	1.5	6.8	2.8	2.9
30 August 46	4.2	0	2.3	7.0	35

Mycotic Dermatoses

5 July 46	10.1	0	16	11	0
12 July 46	10.5	1.4	12	12	1.9
19 July 46	10.2	13	8	14	0
26 July 46	9.8	2.8	14	14	3
2 August 46	7.5	7.1	8	9.2	2.0
9 August 46	7.5	4.9	8	9.6	2.1
16 August 46	8.0	2.4	11	8.1	0
23 August 46	6.5	9.2	5	8.9	0
30 August 46	10	9.8	15	9.7	12

ADMISSION RATES PER 1000 PER ANNUM

Venereal Disease

Week Ending	AFAPAC	AFMIDPAC	AFWESPAC	JAPAN	KOREA
5 July 46	103	8	115	131	67
12 July 46	152	14	171	202	60
19 July 46	126	23	134	162	72
26 July 46	126	60	156	145	64
2 August 46	103	20	107	141	60
9 August 46	120	24	160	138	52
16 August 46	126	38	163	136	75
23 August 46	148	46	152	191	71
30 August 46	136	36	144	171	84